

THE CLAIMS

1. A method of performing online computer maintenance on at least one node, the method comprising:
 - running a virtual machine monitor;
 - running a first operating instance on the virtual machine monitor;
 - running a second operating system instance on the virtual machine monitor as a substitute for the first instance; and
 - performing the maintenance with respect to one of the instances while using the other of the instances.
2. The method of claim 1, wherein the second operating system is run as a substitute by migrating at least one application from the first instance to the second instance, and using the migrated applications on the second instance.
3. The method of claim 1, further comprising shutting down the first instance after the second instance has been run as a substitute.
4. The method of claim 1, wherein the maintenance includes hardware servicing; and wherein the second operating system instance is run without a dependency on the hardware to be serviced.
5. The method of claim 4, wherein the servicing includes removing the hardware from a node.

6. The method of claim 4, wherein the virtual machine monitor is used to hide the hardware to be serviced from the second instance during bootup of the second instance.

7. The method of claim 4, wherein the virtual machine monitor releases its own dependencies on that hardware prior to removal.

8. The method of claim 1, wherein the maintenance includes hardware addition; wherein the virtual machine monitor discovers the added hardware; and wherein the virtual machine monitor shields the first operating system instance from the hardware as the hardware is being added.

9. The method of claim 8, wherein the hardware is added before the second instance is booted; and wherein the second instance is allowed during bootup to see the added hardware.

10. The method of claim 1, wherein applications running on the first operating system instance are migrated to the second instance; and wherein software maintenance is performed.

11. The method of claim 10, further comprising shutting down one of the instances after the applications have been migrated.

12. The method of claim 1, wherein the second operating system instance is an upgraded operating system; and wherein applications running on the first operating system instance are migrated to the second instance.

13. The method of claim 1, wherein the maintenance includes modifying the second operating system instance; and wherein the method further includes migrating applications running on the first operating system instance to the second instance.

14. The method of claim 1, further comprising migrating applications from the first instance to the second instance before the maintenance is performed; migrating the applications from the second instance back to the first instance after the maintenance has been performed; and shutting down the second instance following the application migration to the first instance.

15. The method of claim 1, wherein a first application instance is running on the first operating system instance before the maintenance is performed; and wherein the maintenance includes running a second application instance on the second OS instance, and modifying the second application instance, and cutting over from the first application instance to the modified second application instance.

16. The method of claim 1, wherein the virtual machine monitor allows at least one of the operating system instances to have direct control over at least one of a processing unit, memory and I/O of the at least one node.

17. The method of claim 1, wherein first instance is booted prior to running the virtual machine monitor; and wherein the virtual machine monitor is interposed beneath the first operating system instance when maintenance is to be performed.

18. The method of claim 1, wherein at least one of a processing unit, memory and I/O is devirtualized after the maintenance has been performed.

19. The method of claim 1, wherein a single processor is used to run the virtual machine monitor and the multiple operating system instances.

20. The method of claim 1, wherein a single node is used to run the virtual machine monitor and the multiple operating system instances.

21. A node comprising a processing unit and memory for the processing unit, the memory encoded with a virtual machine monitor and an operating system, the virtual machine monitor running a second instance of the operating system when a first instance is already running in the node, the second instance being run when maintenance is to be performed, the second instance being a substitute for the first instance, the virtual machine monitor allowing the maintenance to be performed with respect to one of the instances while using the other of the instances.

22. The node of claim 21, wherein the second operating system is run as a substitute by migrating at least one application from the first instance to the second instance, and using the migrated applications on the second instance.

23. The node of claim 21, wherein the virtual machine monitor shuts down the first instance after the second instance has been run as a substitute.

24. The node of claim 23, wherein the virtual machine monitor is used to hide the hardware to be serviced from the second instance during bootup of the second instance.

25. The node of claim 21, wherein the maintenance includes hardware addition; wherein the virtual machine monitor discovers the added hardware; and wherein the virtual machine monitor shields the first operating system instance from the hardware as the hardware is being added.

26. The node of claim 25, wherein the hardware is added before the second instance is booted; and wherein during bootup the virtual machine monitor allows second instance to see the added hardware.

27. The node of claim 21, wherein applications running on the first operating system instance are migrated to the second instance; and wherein software maintenance is performed.

28. The node of claim 21, wherein the maintenance includes modifying the second operating system instance; and wherein applications running on the first operating system instance are migrated to the second instance.

29. The node of claim 21, wherein applications are migrated from the first instance to the second instance before the maintenance is performed; the applications are migrated from the second instance back to the first instance after the maintenance has been performed; and wherein the virtual

machine monitor shuts down the second instance following the application migration to the first instance.

30. The node of claim 21, wherein the virtual machine monitor allows at least one of the operating system instances to have direct control over at least one of a processing unit, memory and I/O of the at least one node.

31. The node of claim 21, wherein first instance is booted prior to running the virtual machine monitor; and wherein the virtual machine monitor is interposed beneath the first operating system instance when maintenance is to be performed.

32. The node of claim 21, wherein the virtual machine monitor devirtualizes at least one of a processing unit, memory and I/O after the maintenance has been performed.

33. An article for a processing unit of a node, the article comprising computer memory encoded with a virtual machine monitor for running first and second instances of an operating system, the second instance being run when maintenance on the node is to be performed, the second instance being a substitute for the first instance, the virtual machine monitor allowing the maintenance to be performed with respect to one of the instances while using the other of the instances.

34. The article of claim 33, wherein the virtual machine monitor shuts down the first instance after the second instance has been run as a substitute.

35. The article of claim 34, wherein the virtual machine monitor is used to hide the hardware to be serviced from the second instance during bootup of the second instance.

36. The article of claim 33, wherein the maintenance includes hardware addition; wherein the virtual machine monitor discovers the added hardware; and wherein the virtual machine monitor shields the first operating system instance from the hardware as the hardware is being added.

37. The article of claim 36, wherein the hardware is added before the second instance is booted; and wherein during bootup the virtual machine monitor allows second instance to see the added hardware.

38. The article of claim 33, wherein the virtual machine monitor causes applications running on the first operating system instance to be migrated to the second instance; whereby software maintenance can be performed.

39. The article of claim 33, wherein the maintenance includes modifying the second operating system instance; and wherein the virtual machine monitor causes applications running on the first operating system instance to be migrated to the second instance.

40. The article of claim 33, wherein the virtual machine monitor causes applications to be migrated from the first instance to the second instance before the maintenance is performed; wherein the virtual machine monitor causes the applications to be migrated from the second instance

back to the first instance after the maintenance has been performed; and wherein the virtual machine monitor shuts down the second instance following the application migration to the first instance.

41. The article of claim 33, wherein the virtual machine monitor allows at least one of the operating system instances to have direct control over at least one of a processing unit, memory and I/O of the at least one node.

42. The article of claim 33, wherein first instance is booted prior to running the virtual machine monitor; and wherein the virtual machine monitor is interposed beneath the first operating system instance when maintenance is to be performed.

43. The article of claim 33, wherein the virtual machine monitor can devirtualize at least one of a processing unit, memory and I/O after the maintenance has been performed.